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Efficacy of *Adiantum capillus veneris* Linn in chemically induced urolithiasis in rats

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ABSTRACT

Ethnopharmacological relevance: *Adiantum capillus veneris* Linn has been recommended in ancient literature of Unani system of medicine as an important ingredient of many formulations for the treatment of urolithiasis. Its decoction has long been used for the same purpose by several Unani physicians.

Aim of study: To investigate the antiurolithiasic effect of the hydro alcoholic extract of *Adiantum capillus veneris* Linn in male Sprague Dawley rats.

Material and methods: The effects of oral administration of hydro alcoholic extract of test drug were studied on calcium oxalate urolithiasis. A total of 48 rats were used for the study. The animals were divided into six groups of eight animals each. Plain control rats were treated with distilled water only, throughout the study period, whereas in other groups nephrolithiasis was induced by providing drinking water containing 0.75% ethylene glycol and 1% ammonium chloride for 7 days. Thereafter, urine was examined for the presence of crystals. Negative control group A rats were sacrificed after 7 days, whereas negative control group B was left untreated up to the end of study. Test groups were treated with 127.6 mg/kg and 255.2 mg/kg of test drug and standard control with Cystone (750 mg/kg) for 21 days. At the end of experiment, number of crystals in urine and levels of calcium, phosphorus, urea and creatinine in serum were observed. Histopathological study of the kidney was done by light microscopy.

Results: Urine microscopy showed significant reduction ($p < 0.001$ and $p < 0.01$) in the number of crystals in test groups A and B respectively. Serum levels of calcium, phosphorus, and blood urea were found to be decreased significantly in all the groups. In both the test groups, serum creatinine level was found to be similar as in plain control. The animals treated with test drug showed much improvement in body weight. Histopathology of kidney showed almost normal kidney architecture in treated groups.

Conclusion: The above findings indicate the antiurolithic activity of *Adiantum capillus veneris* Linn, and thus, validate the claims of Unani physicians for its medicinal use in urolithiasis.

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1. Introduction

Urolithiasis is a complex process that results from a succession of several physicochemical events including supersaturation, nucleation, growth, aggregation and retention within the renal tubules (Bouanani et al., 2010). Levels of urinary supersaturation co-relate with the type of stone formed. Any cellular dysfunction

that can affect various urinary ions and other substances can also influence calcium oxalate supersaturation and crystallization in the kidney. Formation of renal stone starts with the transient supersaturation that occurs within kidneys while excretion of millions of urinary crystals through them. However, supersaturation is only one step in the process of stone formation. It further needs crystals to be retained and cause ulceration within the kidneys. Renal injury in its turn, promotes crystal retention and development of a stone nidus on the renal papillary surface and further supports crystal nucleation at lower supersaturation. Reactive oxygen species (ROS_s) also seem to be responsible for cellular injury, therefore a reduction of renal oxidative stress could also be an effective therapeutic approach (Butterweck and Khan, 2009). Till date there is no satisfactory drug to be used for clinical therapy. A number of vegetable drugs are being used in many parts of the world for the treatment of urolithiasis (Bouanani et al., 2010). *Adiantum capillus veneris* Linn is traditionally used in Unani system of medicine for

Abbreviations: AC, Ammonium chloride; ACV, *Adiantum capillus veneris* Linn; BUN, Blood urea nitrogen; CaOx, Calcium oxalate; CPCSEA, Committee for the purpose of control and supervision of experiment on animals; EG, Ethylene glycol; GFR, Glomerular filtration rate; HPF, High power field; LPO, Lipid peroxidation

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